Ophthalmology

	General/Clinical	Management
Sclera Disorders		
Scleritis	- Acute inflammation of the sclera. Potentially blinding. - Often associated with RA or vasculitis (ie Wegener's) - Presents with ocular redness, severe pain (worse with eye movements), eye watering, possible visual impairment	Dx: Clinical/slit-lamp examination Tx: NSAIDs. Prednisone + Rituximab for severe cases.
Episcleritis	- Inflammation of the episclera. Benign and self-limited. - Usually idiopathic, can be associated with rheumatologic condition - Presents with focal erythema/injection, vasodilation of the episcleral vessels, possible irritation, but no visual loss	Tx: Self-limited. Topical lubricants.
Lens Disorders		
Cataracts (adult)	- Opacification of the lens (present in 50% over 75) - Risk: ↑ Age, smoking, EtOH, light exposure, diabetes, steroids - Presents with decreasing visual acuity (especially in the dark, with glare around bright lights) - Myopic shift: Increased refractive power of the lens, causing nearsightedness	Dx: Clinical (slit-lamp exam) Tx: Surgical extraction/artificial lens replacement
Presbyopia	- Loss of normal accommodating power of lens, occurring with ↑ age - Presents with difficulty reading close, fine print	Tx: Reading glasses
Refractive Errors	- Myopia (nearsightedness) - Hyperopia (farsightedness) - Astigmatism (abnormal corneal shape)	Dx: Snellen chart (worse than 20/25) Tx: Glasses, contact lenses, or refractive surgery (Lasik)
Corneal Disorders		
Corneal Abrasion	- Corneal insult from direct trauma, foreign bodies, contact lens - Presents with severe eye pain (CN V) - Foreign body sensation in eye, irritation - Photophobia, refusal to open eye	Dx: Fluorescein examination. Rule out retained foreign body with careful exam under eyelid. Tx: Usually improve within 2-3 days. Topical antibiotic prophylaxis (Erythromycin, Ciprofloxacin). Oral or topical NSAIDs for analgesia.
Keratitis	- Inflammation of the cornea, with bacterial, viral, fungal causes - Often associated with contact lens use (especially with bad hygiene, overuse of single-use lens, etc). Also dry eyes, topical corticosteroid use. - Presents with corneal infiltrate +/- mucopurulent discharge - Red eye, photophobia, foreign body sensation	Dx: Penlight exam (infiltrate appears like small white spot, stains (+) with fluorescein) Tx: See specific etiology below
Bacterial Keratitis	- *Staph aureus, Pseudomonas* most commonly	Tx: Topical antibiotics
Viral Keratitis	- Most commonly HSV - Corneal lesion is classically described as dendritic (forms from initial vesicular lesions)	Tx: Oral or topical antivirals
Amebic Keratitis	- *Acanthamoeba* infection almost always associated with poor contact lens hygiene - Can rapidly lead to vision loss if not treated	Tx: Topical antiparasitic agents (Polyhexamethylene Biguanide, Hexamidine, etc)

Ophthalmology

	General/Clinical	Management
Sudden Visual Loss		
Central Retinal Artery Occlusion	- Similar etiology to CVA (atherosclerosis, embolic, etc) - Presents with acute, painless single sided visual loss - Poor prognosis, often leads to permanent visual loss	Dx: Clinical plus fundoscopy (pale retina whitening with cherry red spot) Tx: Ocular massage, anterior chamber paracentesis, reduce intraocular pressure
Central Retinal Vein Occlusion	- Thrombotic occlusion of retinal veins, with resulting ischemia - Risks: Coagulopathy, hyperviscosity, atherosclerosis - Presents with acute/subacute progressive loss of visual acuity (less sudden than arterial). Can be asymptomatic.	Dx: Fundoscopy (Disc swelling, venous dilation, hemorrhages, cotton wool spots) Tx: Observation. anti-VEGF injections for macular edema, laser treatment for neovascularization.
Retinal Detachment	- Separation of the neurosensory retina from the retinal pigment epithelium, leading to ischemia and vision loss - Often evolves from underlying posterior vitreous detachment or retinal tears - Risk: Eye trauma, diabetes mellitus, myopia - Presents with floaters/flashes of light, which can progress to peripheral vision loss ("curtain over visual field")	Dx: Fundoscopy (retinal breaks/abnormalities, grey elevated retina, pigmented cells in vitreous) Tx: Laser retinopexy or cryoretinopexy
Vitreous Hemorrhage	- Leakage of blood into vitreous humor of the eye - Associated with retinal tears, trauma and child abuse - Presents with impaired vision, floaters, and light flashes	Dx: Fundoscopy (retina obscured by floating cells in vitreous) Tx: Elevated head, allow hemorrhage to settle. Treat underlying cause (ie tear, detachment).
Retinal Disorders		
Diabetic Retinopathy	- Associated with DM1 and DM2 Classification - Nonproliferative: Microaneurysms, hemorrhages, exudates, and cotton wool spots - Proliferative: Neovascularization (can lead to vitreous hemorrhage and/or retinal detachment) - Generally asymptomatic until late stage	Dx: Fundoscopy (screen diabetics yearly) Tx: - Glycemic control (Hgb A1C < 7%), BP control - Proliferative: Photocoagulation or anti-VEGF
Hypertensive Retinopathy	- Refers to retinal changes directly associated with chronic HTN - Arterial wall thickening, AV nicking, flame hemorrhage, exudate, cotton-wool spots, optic disc edema/papilledema	Dx: Fundoscopy Tx: Manage underlying hypertension
Macular Degeneration	- Most common cause of blindness in developed countries Classification - Dry: Atrophy and degeneration of the central retina, drusen deposition - Wet: Leakage of serous fluid/blood with neovascularization - Risk: ↑ Age, smoking, EtOH use, family history - Presents with central vision loss, scotomas, metamorphopsia	Dx: Fundoscopy (areas of retinal atrophy, depigmentation, drusen). Edema, hemorrhage, and neovascularization in wet MD. Tx: - Dry: Supportive. eye vitamins, quit smoking - Wet: anti-VEGF injections
CMV Retinitis	- Reactivation of latent CMV, with full thickness inflammation of the retina - Common disease in AIDS with CD4 < 50 - Presents with loss of central vision, scotoma/floaters	Dx: Fundoscopy (fluffy retinal lesions, hemorrhage) Tx: Ganciclovir (either oral or intravitreal), proper ART therapy
Retinitis Pigmentosa	- Inherited progressive retinal degeneration - Presents with night blindness, peripheral visual field loss - Ophthalmoscopy: Pigment deposits, pale optic nerve	Dx: Clinical, plus advanced retina testing

Ophthalmology

Glaucoma (Chronic)

General: Increased IOP leading to damage to optic neuropathy and irreversible vision loss (peripheral vision, followed by central)

	Open Angle	Closed Angle
Path	- ↑ Aqueous humor production or ↓ outflow	- Narrowing of the anterior chamber angle, ↓ aqueous humor outflow
Risk	- ↑ Age, family history, black	- Primary: ↑ Age, family history, hyperopia - Secondary: Fibrosis, inflammation, mass, or neovascularization
Clin	- Asymptomatic - Progressive peripheral visual field loss with eventual "tunnel vision," followed by central vision loss	- Can present with acute blockage (see below) OR chronic, asymptomatic process (like open angle) with progressive peripheral visual field loss
Dx	- Fundus examination (cupping) - Tonometry. ↑ IOP (> 25 mmHg) is consistent with glaucoma, but not diagnostic - Gonioscopy (diagnostic for closed-angle, allows for visualization of angle)	
Tx	- First line therapy: Pharm and surgery equal efficacy Pharm - Prostaglandins (Latanoprost, Bimatoprost), beta-blockers (Timolol) - Others (less frequently): CA inhibitors, alpha-agonists, cholinergic agonists Surgery: Trabeculoplasty	- Surgery: Laser peripheral iridotomy is definitive treatment Note: Treat/remove underlying cause if secondary to another process

Drug	Class/Mechanism	Side Effects
Timolol	β-blocker	- Generally well-tolerated
Bimatoprost Latanoprost	Prostaglandins	- Heterochromia, ↑ eyelash length - Conjunctival hyperemia
Acetazolamide	Carbonic Anhydrase Inh.	
Pilocarpine Physostigmine	Cholinomimetics	- Miosis (if chronic use)
Epinephrine Brimonidine	α-agonist	- Ocular hyperemia, blurred vision, discomfort - Mydriasis

Acute Angle Closure Glaucoma

Clinical:

- Decreased visual acuity, abnormal halo around light
- Headache/severe eye pain, possibly associated with nausea and vomiting
- Conjunctival erythema, dilated pupils

Management:

- Emergent therapy/ophtho referral
- Topical beta-blocker (Timolol), alpha-agonist (Brimonidine, Apraclonidine), miotic agents (Pilocarpine)
- Acetazolamide or Mannitol

Ophthalmology

	General/Clinical	Management
Eyelid Pathology		
Hordeolum (stye)	- Small abscess of the eyelid (most commonly *Staph aureus*) - Presents as small, painful, erythematous swelling, either externally at eyelid margin, or internally on conjunctiva	Dx: Clinical Tx: Self-limited. Warm compress. I&D if persistent.
Chalazion	- Chronic granulomatous infection of meibomian gland - Presents as painless, localized eyelid nodule or swelling on inner eyelid (less painful, red, and angry compared to styes)	Dx: Clinical Tx: Self-limited. Persistent lesions: I&D or steroid injection.
Xanthelasma	- Cholesterol-filled yellow plaques associated with hypercholesterolemia	Dx: Cholesterol panel Tx: Intervention not required
Dacryocystitis	- Infection of lacrimal sac from nasolacrimal duct obstruction - Pain, erythema, swelling over the medial canthus	Dx: Clinical Tx: Oral antibiotics
Dacryostenosis	- Obstructed lacrimal duct. Common congenital abnormality in children. - Presents with chronic, excessive tearing, debris in eyelids. Possible swelling in medial eye.	Dx: Clinical Tx: Self-limited in most cases. Can perform lacrimal sac massage. Surgical probing for refractory cases.
Blepharitis	- Inflammation of the eyelids, most commonly occurring near eyelid margin - Present with erythematous, swollen, itchy eyelids. Possible associated symptoms include blurry vision, excessive tearing, gritty sensation, flaking/scaling.	Dx: Clinical Tx: Eyelid massage, warm compress, and washing. Topical antibiotics for severe or refractory cases.
Conjunctival Disorders		
Conjunctivitis		
Bacterial	- Erythema, thick mucoid discharge, most often unilateral. Eye often stuck shut in morning (common conjunctivitis feature). - *Staph aureus*, pneumococcus, *H. influenzae*, most common	- Erythromycin ointment or Trimethoprim/ Polymyxin drops
Viral	- Erythema, mucoid/serous discharge, itching/burning/gritty sensation, most often bilateral - Can occur as part of viral syndrome (ie URI). Adenovirus most common.	- Self-limited. Fake tears, antihistamines.
Allergic	- Bilateral erythema, watery discharge, and itching - History of atopy (ie atopic dermatitis, asthma, etc)	- Avoid allergens. Cool compress/fake tears. - Acute: Topical antihistamine/vasoconstrictor (ie Naphazoline/Pheniramine) - Chronic: Antihistamine/Mast cell stabilizer (Olopatadine, Azelastine)
Trachoma	- MCC blindness in world. Infection with *Chlamydia trachomatis*. - Active trachoma causes mild conjunctival inflammation - Repeated episodes can lead to cicatricial disease, in which chronic eyelid inflammation and scarring turns lids inwards (entropion), ingrown eyelashes (trichiasis), and eventual blindness	Dx: Clinical. Culture/PCR for chlamydia if unsure. Tx: Antibiotics (Azithromycin, Tetracycline). Surgery for trichiasis.
Subconjunctival Hemorrhage	- Can be idiopathic or occur with trauma/eye contact - Presents as focal collection of blood between conjunctiva and sclera	Tx: Self-limited (resolve in a few weeks)
Dry Eye	- Also referred to as keratoconjunctivitis sicca - Decreased tear production or excessive tear evaporation - Presents with chronic dry eye, irritation, burning	Tx: Artificial tears

Ophthalmology

Eye Movement Disorders	
Lesion	**Features**
CN III	- Parasympathetic (external nerve fibers): Subject to compression. Causes pupillary dilation with abnormal light reflex. - Motor (internal nerve fibers): Damaged from vascular disease (ie diabetes mellitus). Causes down/out gaze, ptosis, diplopia.
CN IV	- Innervates superior oblique muscle - Presents as vertical/oblique diplopia, worse with downward gaze. Patients often head tilt toward side of lesion. Worsening misalignment (eye moves upward) with adduction of eye.
CN VI	- Impaired abduction on side of lesion
Internuclear Ophthalmoplegia	- Lesion in medial longitudinal fasciculus (normally coordinates CN VI/CN III movements) - Lesions cause conjugate horizontal gaze palsy - Example (right MLF): With leftward gaze, left eye abducts with nystagmus, right eye has impaired adduction (does not move past midline)
Frontal Eye Field Lesions	- Lesions in the frontal eye field result in eyes deviated towards the side of the lesion

Ophthalmology

Neurology
Medicine, Pediatrics

	General/Clinical	Management
Pediatric Eye Disorders		
Cataracts	- Can be idiopathic, or associated with trauma, glucocorticoid use, or congenital infections/disorders - Presents with asymmetric red reflex, leukocoria, photophobia, decreased visual acuity	Dx: Clinical (slit-lamp exam) Tx: Surgical extraction/artificial lens replacement
Dacryostenosis	- Due to congenital nasolacrimal duct obstruction - Presents with persistent tearing and discharge	Dx: Clinical Tx: Lacrimal sac massage, observation (self-limited)
Amblyopia ("Lazy Eye")	- Decreased visual acuity from abnormal visual development, due to strabismus, refractive errors, or other structural eye issues	Dx: Routine screening < 5 y/o (fixation testing for preverbal, visual acuity if verbal) Tx: Treat underlying condition. Encourage use of lazy eye (patch/Atropine drops for other eye).
Strabismus	- Abnormal ocular alignment - Primary (idiopathic) or secondary to acquired ocular or CNS diseases - Definitions: Esotropia (nasal), exotropia (temporal), hypertropia (upward), and hypotropia (downward) - Presents with asymmetry of red or corneal light reflexes, possible head tilt, abnormal cover-uncover test - Amblyopia can develop if not treated	Tx: < 4 months: Watchful waiting - Occlusion therapy (patch good eye) OR penalization therapy (cycloplegic drops in good eye) - Eyeglasses (to correct refractive errors) - Surgery if refractory
Retinopathy of Prematurity	- Overproliferation of retinal blood vessels from excess O_2 exposure (seen in premature, low birth weight babies) - Common cause of childhood blindness	Dx: Retinal examination Tx: Monitor mild disease, laser coagulation and VEGF inhibitors for severe disease
Retinoblastoma	- Most common childhood ocular malignancy - Can be heritable (germline RB1 mutation) or sporadic - Presents with leukocoria, strabismus	Dx: Retinal exam, plus ocular US/MRI Tx: Laser or cryotherapy, +/- local/systemic chemotherapy
Misc. Eye Disorders		
Globe Rupture	- Can be caused by blunt trauma or penetrating trauma - Presents with eye deformity and volume loss. Possible findings include eccentric pupil, pupillary defects, decreased visual acuity.	Dx: Clinical. CT is used to better characterize. Tx: Prophylactic antibiotics, tetanus. Avoid increasing eye pressure (no pressure on eye). Primary surgical closure is definitive.
Optic Neuritis	- Acute inflammatory demyelination of optic nerve - Associated with MS, NMO, etc - Presents with monocular vision loss. Possible color desaturation or pupillary defect. - Possible optic nerve inflammation or atrophy on exam	Dx: MRI Tx: High-dose steroids

Ophthalmology

Uveitis

General: Intraocular inflammation

Etiology: Systemic inflammatory condition, viral (HSV, VZV), parasite (toxoplasmosis)

	Anterior	Posterior
Path	Anterior chamber inflammation, including: - Iritis - Iridocyclitis	Inflammation posterior to lens, including: - Vitritis - Pars planitis - Chorioretinitis
Clin	- Red eye, pain, photophobia, possible decreasing visual acuity	- Presents with decreased visual acuity, painless
Dx	- Clinical (history + slit lamp) - Leukocyte/protein accumulation in anterior chamber	- Clinical (history + slit lamp) - Chorioretinal inflammation, leukocytes in vitreous humor
Tx	- Topical glucocorticoids	- Intraocular glucocorticoids

Associated Conditions:

- Sympathetic Ophthalmia: Anterior uveitis that occurs ~ 1 year after penetrating trauma to other eye (believed due to systemic antigen exposure/AI response)

- Acute Retinal Necrosis: Reactivation of HSV, HZV or other virus seen in severe immunocompromised states. Presents with prodrome of keratoconjunctivitis, then progresses to bilateral necrotizing retinitis. Clinical diagnosis (ophthalmoscopy shows retinal/vitreal inflammation, retinal vascular arteriolitis). Treat with Acyclovir/Valacyclovir.

Endophthalmitis

General: Infection within eye, including vitreous/aqueous humor

Etiology: Post-surgery, penetrating eye trauma, keratitis

Clinical: Presents with eye pain, decreased visual acuity, conjunctival injection, hypopyon (WBCs in anterior chamber)

Management: Vitrectomy. Intravitreal antibiotics.